1,029,537

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,029,537

Date of Application and filing Complete Specification: Aug. 27, 1963.

No. 33890/63.

Application made in Norway (No. 145,602) on Sept. 3, 1962.

Complete Specification Published: May 11, 1966.

Index at acceptance:—B8 D(7M, 16)

Int. Cl.:—B 65 d

COMPLETE SPECIFICATION

Improvement in Containers for Sensitive Liquids

I, GUNNAR NIMROD PETTERSEN, of Askim, Norway, a Norwegian subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Liquids which are liable to damage or deterioration when in contact with the atmosphere, for example cod liver oil, and some medicines, juices, drinks and chemicals, can as a rule be protected in a relatively reliable manner during storing in bottles, cans, tins or similar containers until the container is opened, by means of gaskets, seals and other tightening means, and, if desired, a covering layer of a protecting liquid. Further, when the container is full, the liquid surface is usually located within a narrow neck affording a small contact area. However, if the liquid to be protected is discharged in portions, either at regular intervals or occasionally, over a prolonged period, it will deteriorate because the space overlying the liquid in the container will be filled with air, which upon each discharge will be more or less renewed and will occupy an increasing volume. In addition, the contact area between the air and liquid will in the case of a container having a neck increase to the full internal cross-section of the container as the container is emptied. Therefore for example in the case of cod liver oil, a constantly more pronounced trainy taste and a constant decrease in the proportion of valuable substances, especially vitamins, can be noted as the liquid deteriorates. In the case of liquids to be used in the tropics, the deterioration is considerably worse, because of the increased detrimental effect on the liquid of the atmosphere in a hot climate.

Various proposals have been made for keeping the surface of liquids in containers covered against the atmosphere even after partial discharge. Thus, in containers for paint, ink and the like where the discharge is effected through an opening at the top of the container, a removable disk provided with a handle has been used for this purpose. These disks fit into the container either snugly or with a clearance and have in the latter case been made of cork so as to float on the liquid. Due to a certain flexibility of the cork they may then even be inserted and removed through a somewhat restricted top opening like those commonly used in boxes for paint.

In all these structures the cover for the liquid surface has to be removed before the liquid is discharged. This entails the danger of soiling the surroundings and may, especially in the case of sensitive liquids, cause undesired contamination of the same.

The present invention aims at solving the problem referred to in a manner which is more satisfactory in these respects and is well suited for protecting particularly sensitive liquids, such as medical cod liver oil, and provides a container having a tubular body portion joined by a shoulder to a constricted discharge neck and containing, entrapped within the body portion by the shoulder, a substantially disc-shaped cover occupying substantially the whole of the cross section of the body portion and adapted to float horizontally on the surface of such liquid in the container so as to cover and protect the surface of the liquid when the container is upright, there being sufficient peripheral clearance between the cover and the body portion to permit free movement of the cover to remain on the surface of the liquid when the container is tilted without preventing the pouring of the liquid out through the discharge neck, and the floating cover being substantially symmetrical about a horizontal plane and so tapering towards its periphery as to cause liquid left on its upper exposed surface after partial discharge to drain off over its edges.

Thus, any removal of the floating body or cover in use is not only superfluous, but even practically impossible, so that both soiling

of the surroundings and contamination of the liquid by handling of the floating body are safely avoided and the discharge can still take place in the normal manner by pouring.

The invention extends to containers of this description whether they are open or closed, and whether they are empty or filled, and likewise extends to the preferred method of making the same, according to which the insertion of the floating body takes place before filling.

Examples of the invention will now be described with reference to the accompanying drawings in which:—

Figs. 1 and 2 are diagrammatic views in longitudinal section of a bottle provided with a floating body in accordance with the invention, and in full and half empty conditions, respectively,

Fig. 3 is a diagrammatic view in longitudinal section of the bottle of Figs. 1 and 2 during pouring,

Fig. 4 is a more detailed view in longitudinal section of an embodiment of a metal bottle or can provided with a floating body in accordance with the invention,

Fig. 5 is a top view of the bottle shown in Fig. 4,

Fig. 6 shows, corresponding in axial section and on a slightly larger scale, the floating body of the bottle of Fig. 4,

Fig. 7 is a top view of a liquid container and floating body in accordance with a further embodiment of the invention,

Figs. 8 and 9 are top and cross-sectional views, respectively, of the floating body of the container of Fig. 7, and

Fig. 10 is a cross-sectional view of the body of Figs. 8 and 9 in folded condition.

Referring to Figs. 1 to 3, the bottle or container 1 may consist of any suitable material convenient for the liquid contents. Most conveniently, however, the material is one that is easily shaped with narrow tolerances, for example a metal. At the top the container has an outlet through a neck 5 closed by a screw-cork. The shape of the container may be varied in many ways, provided that it has substantially the same internal cross-section throughout most of its height and has an outlet at the top, and care is taken that the floating body or cover 3 is entrapped whilst being freely movable within the container. The shoulder portion 4 thereof, which forms a transition to the discharge neck 5, prevents the floating body or cover 3 from being discharged with the liquid and from being wedged in the outlet.

The floating body 3 is substantially flat and has a shape complementary to that of the internal cross-section of the main cylindrical part of the container with a slight clearance from the walls. If the bottle is filled up to the neck, the cover 3 will be entirely submerged in the liquid, but as soon as the small quantity of liquid above it has been poured out it will constitute a partition between the liquid and the air throughout the whole area of the liquid surface, except for the clearance. The body conveniently has top and bottom sides of the same shape so that it is immaterial which way up the body is disposed. Further it is conveniently rounded at the edges in order to be as freely movable as possible. It is also convenient to make the upper face, or both the upper and lower faces in the case of a symmetrical shape, a convex cone so as to permit any liquid that may be brought onto the upper side of the body during pouring, to flow out to the edges, which effect is enhanced by the cohesion of the liquid. Thus, in the case of a symmetrical shape the thickness should constantly decrease toward the edges from a peak on each side. The average specific weight of the body can be made such that the portion of the body having the greatest diameter will be located exactly in the liquid surface as indicated in Fig. 2. However, this is not essential, the more because it is possible, due to adhesion and surface tension, to achieve between the edge of the body and the inner face of the bottle, a film which separates a small air space, that might possibly exist under the body, from the air above the floating body.

During pouring the floating body 3 will, because of its buoyancy, constantly adopt a substantially horizontal position in the liquid surface as shown in Fig. 3, and at the same time be withheld by the shoulder portion 4, so that the liquid is allowed to flow out freely under the floating body.

In order to obtain the necessary buoyancy of the floating body or cover 3 the same may be made hollow, or porous, provided that the pores do not extend through it. The body 3 may be made of a rigid material, for example a metal, compatible with the liquid, and must in that case be inserted into the container before the latter receives its final shape, that is before it is assembled if it consists of several parts, or before the neck is formed, for example in the case of metal bottles. But the body 3 may be made flexible, so that it can be pressed together for insertion through the mouth of a bottle, and may then be made to adopt its desired shape within the bottle.

Figs. 4 and 5 illustrate an embodiment of a metal bottle or can 6 which has a circular cylindrical shape throughout most of its length, is composed of two parts, and which receives a hollow metal floating body 7 of a shape shown more clearly in Fig. 6. In the form shown the bottle is suitable for storing medical liver oil and may for this purpose conveniently consist of aluminium, and the body 7 may consist of the same material. Also in this case the bottle has a screw-threaded neck 8 and a shoulder portion 9 constituting a transition from the full container cross-sec-

tion to the neck. The container has a bottom 10 fixed by means of a flange and the floating body or cover 7 can therefore be inserted into the container before the bottom is fixed although it is, of course, also possible to fix the bottom onto a cylindrical container blank and insert the body 7 before the neck 8 and the shoulder portion 9 are formed. The body 7 has a circular shape complementary to that of the cylindrical interior of the container and each of its sides has the shape of a convex cone. The floating body 7 is composed in this case of two parts which are assembled by simply making one part 11 have such a tight frictional fit in the other part 12 that leakage of liquid into the body is prevented. When the container 6 is filled in an upright portion, the presence of the floating body will cause no difficulty, since it will lie on the bottom, as shown in Fig. 4, upon the commencement of filling and float upwards during filling. In the case of rapid filling it will usually rise more slowly than the liquid surface, but with a suitable clearance against the walls there is no fear that any air space will be left below the floating body, because of the conical shape of its under side. Thus, the filling operations will be exactly the same as for a bottle without a floating body.

As already mentioned, it is possible to use porous instead of hollow floating bodies and likewise to make the body flexible so that it can be introduced after the manufacture of the bottle as such is finished, if this should be desired for some reason or other. However, the conditions will often be such that materials which have the flexibility necessary for the purpose and, due to their inherent elasticity, are capable of readopting the desired shape by themselves, are not compatible with the liquid concerned and are not susceptible to easy shaping within narrow tolerances. Similar difficulties may also be encountered in the case of porous substances used for the floating body.

An embodiment which solves these difficulties and at the same time has additional inventive features has been illustrated in Figs. 7 to 10.

The container 11 (Figs. 7 to 10) has a body of oblong cross-sectional shape which merges into an outlet neck 13 through a shoulder portion 12, and the floating body 14 has a complementary oblong shape with clearance from the walls. The exterior shape of the body 14 is again substantially symmetrical with respect to a central horizontal plane, but in order to provide a slope sufficiently steep for permitting the liquid to flow off easily, the top and bottom sides slope toward the two longitudinal edges of the body from longitudinal ridge lines 15. The body 14 is composed of two wedge-shaped and mutually symmetrical porous portions 16, made, for example, of cork, and held together by a casing 17 of metal, made for example of aluminium, which is bent around the cork wedges separately, so that the floating body as a whole consists of two halves held together solely along the ridge 15 on one side. Therefore the floating body is capable of being collapsibly folded about this line as shown in Fig. 10, whereby it can be inserted through the neck 13 in spite of the fact that in its operative condition it has a width greater than the diameter of the neck. After having thus been placed in the bottle in a position in which it rests on the bottom, it is possible by introducing a suitable tool through the outlet to press the body 14 out to its desired operative shape as shown in Figs. 8 and 9.

Although it is possible to insert such a foldable floating body after the container has been filled, an insertion before filling is preferable for reasons of easy manufacture and of hygiene.

WHAT I CLAIM IS:—

1. A container for a liquid sensitive to contact with the atmosphere, the container having a tubular body portion joined by a shoulder to a constricted discharge neck and containing, entrapped within the body portion by the shoulder, a substantially disc-shaped cover occupying substantially the whole of the cross section of the body portion and adapted to float horizontally on the surface of such liquid in the container so as to cover and protect the surface of the liquid when the container is upright, there being sufficient peripheral clearance between the cover and the body portion to permit free movement of the cover to remain on the surface of the liquid when the container is tilted without preventing the puring of the liquid out through the discharge neck, and the floating cover being substantially symmetrical about a horizontal plane and so tapering towards its periphery as to cause liquid left on its upper exposed surface after partial discharge to drain off over its edges.

2. A container according to claim 1 wherein the body portion is substantially cylindrical and the cover is substantially conical on either side.

3. A container according to claim 1 in which the floating cover has on either side a roof-like shape with a longitudinal ridge line.

4. A container according to claim 3 in which the floating cover is foldable along one of said ridge lines for insertion into the bottle through the neck and can thereafter be folded out to its required operative shape.

5. A container according to any of claims 1 to 4 wherein the cover is hollow.

6. A container according to any of claims 1 to 4 wherein the cover consists of a porous material covered by an air- and liquid-tight envelope.

7. A container according to any of claims 1 to 6 with a closed neck and filled with such

a volume of medical oil that in the upright position the liquid surface is located in the neck above the cover, the cover being retained submerged in the oil by the shoulder.

8. A container according to claim 1 comprising at least two permanently joined parts of a shape permitting insertion of the floating cover without deformation before the joining.

9. A container substantially as hereinbefore described with reference to Figures 1 to 3 of the accompanying drawing.

10. A container substantially as hereinbefore described with reference to Figures 4 to 6 of the accompanying drawing.

11. A container substantially as hereinbefore described with reference to Figures 7 to 10 of the accompanying drawing.

REDDIE & GROSE,
Agents for the Applicant,
6, Bream's Buildings, London, E.C.4.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press (Leamington) Ltd.—1966. Published by The Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

1029537 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig.1

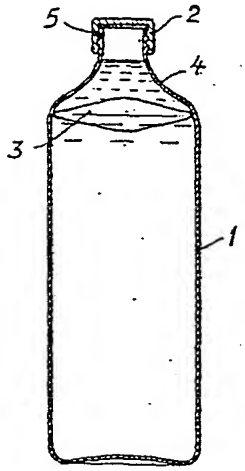
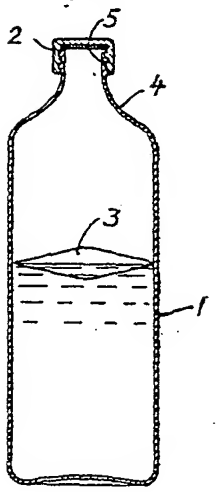


Fig.2



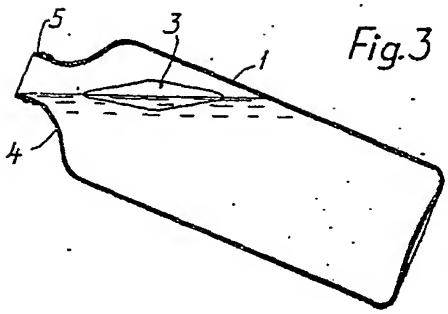


Fig.3

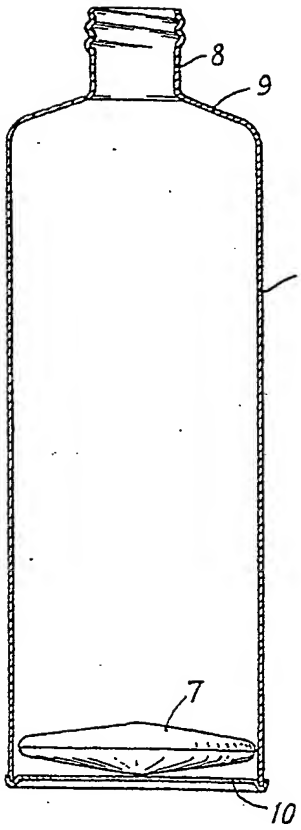
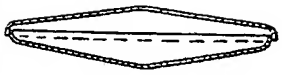


Fig.4

Fig.6



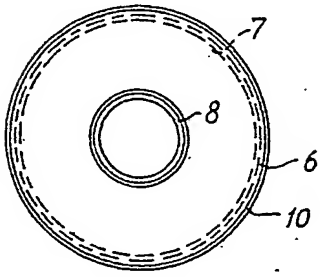


Fig.5

1029537 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 2 & 3

Fig.10

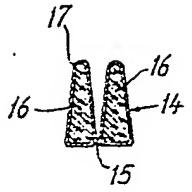


Fig.9

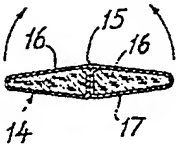


Fig.6

Fig.7

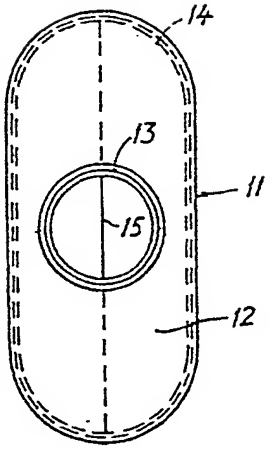
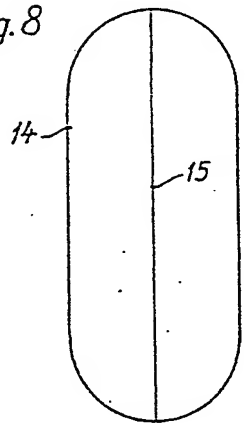


Fig.8



1029537 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 2 & 3

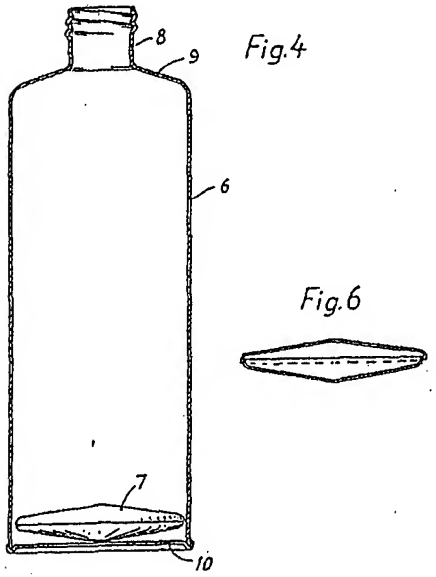


Fig.4

Fig.6

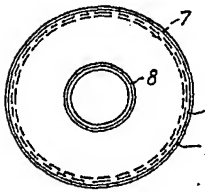


Fig.5

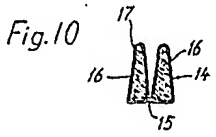


Fig.10

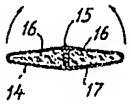


Fig.9

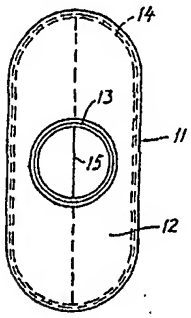


Fig.7

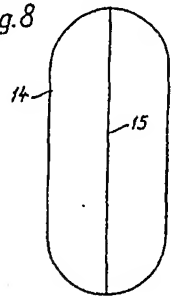


Fig.8